Bachelor of Technology (Electronics Communication Engineering) (Credit Based)
KURUKSHETRA UNIVERSITY KURUKSHETRA
Scheme of Studies/Examination

LIST OF OPEN ELECTIVES		
SEM	**CODE**	**SUBJECT**
V	ECO-1	Computer Networks
	ECO-2	Mechatronics
	ECO-3	Electronic Measurement and Instruments
	ECO-4	Renewable Energy Resources
		MOOC 1
VI	ECO-5	Data Structures
	ECO-6	Multimedia Communication
	ECO-7	Consumer Electronics
	ECO-8	Transducers and Their Applications
		MOOC 2
VII	ECO-9	Bio-informatics
	ECO-10	Electromechanical Energy Conversion
	ECO-11	Operating Systems
	ECO-12	Robotics
		MOOC 3
VIII	ECO-13	Machine Learning
	ECO-14	Soft Computing
	ECO-15	Neural Networks and Fuzzy Logic
	ECO-16	Software Defined Radio
	ECO-17	Statistics and Operational Research
	ECO-18	Biomedical Signal Processing
	ECO-19	Internet of Things
	ECO-20	Wireless Sensor Networks
		MOOC 4
		MOOC 5

LIST OF OPEN ELECTIVES (B.TECH. ECE)

LIST OF PROGRAM ELECTIVES (B.TECH. ECE)

SEM	**CODE**	**SUBJECT**
V	ECP-1	Probability Theory & Stochastic Processes
	ECP-2	Speech and Audio Processing
	ECP-3	Introduction to MEMS
	ECP-4	Power Electronics
	ECP-5	VLSI
VI	ECP-6	Antennas and Propagation
	ECP-7	CMOS Design
	ECP-8	Bio-Medical Electronics
	ECP-9	Scientific Computing
VII	ECP-10	Fiber Optic Communications
	ECP-11	Nano electronics
	ECP-12	Microwave Theory and Techniques
	ECP-13	Adaptive Signal Processing
VIII	ECP-14	Wireless Sensor Networks
	ECP-15	Satellite Communication
	ECP-16	High Speed Electronics
	ECP-17	Wavelets
	ECP-18	Embedded systems
	ECP-19	Mixed Signal Design
	ECP-20	Error correcting codes
	ECP-21	Digital Image & Video Processing
	ECP-22	Mobile Communication and Networks

Bachelor of Technology (Electronics & Communication Engineering) (Credit Based)
KURUKSHETRA UNIVERSITY KURUKSHETRA
Scheme of Studies/Examination
Semester III (w.e.f. session 2019-2020)

Sr. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	BS-201	Optics &Waves	3:0:0	3	3	75	25	0	100	3
2	EC-201	Electronic Devices	3:0:0	3	3	75	25	0	100	3
3	EC-203L	Electronic Devices Lab	0:0:2	2	1	-	40	60	100	3
4	EC-205	Digital Electronics	3:0:0	3	3	75	25	0	100	3
5	EC-207L	Digital Electronics Lab	0:0:2	2	1	-	40	60	100	3
6	EC-209	Signals & Systems	3:0:0	3	3	75	25	0	100	3
7	EC-211L	Signals & Systems Lab	0:0:2	2	1	-	40	60	100	3
8	EC-213	Network Theory	3:0:0	3	3	75	25	0	100	3
9	ES-201	Essentials of Information Technology	3:0:0	3	3	75	25	0	100	3
10	*EC-215	Industrial Training-I	2:0:0	2	-	-	100	-	100	3
11	**MC-901	Environmental Sciences	3:0:0	3	-	75	25	0	100	3
		Total		26	21	450	270	180	900	

*EC-215is a mandatory credit-less course in which the students will be evaluated for the industrial training undergone after 2nd semester and students will be required to get passing marks to qualify.

**MC-901 is a mandatory credit-less course in which the students will be required to get passing grade.

Bachelor of Technology (Electronics & Communication Engineering) (Credit Based)
KURUKSHETRA UNIVERSITY KURUKSHETRA
Scheme of Studies/Examination
Semester IV (w.e.f. session 2019-2020)

S. No.	Course No.	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	BS-204	Higher Engineering Mathematics	3:0:0	3	3	75	25	0	100	3
2	HM-903	Soft Skills & Interpersonal Communication	3:0:0	3	3	75	25	0	100	3
3	EC- 202	Digital Communication	3:0:0	3	3	75	25	0	100	3
4	EC-204L	Communication Lab	0:0:2	2	1	-	40	60	100	3
5	EC-206	Analog Circuits	3:0:0	3	3	75	25	0	100	3
6	EC-208L	Analog Circuits Lab	0:0:2	2	1	-	40	60	100	3
7	EC-210	Microprocessors & Microcontrollers	3:0:0	3	3	75	25	0	100	3
8	EC-212L	Microprocessors & Microcontrollers Lab	0:0:2	2	1	0	40	60	100	3
9	ES-202	Basics of Analog Communication	3:0:0	3	3	75	25	0	100	3
10	*MC-902	Constitution of India	3:0:0	3	-	75	25	0	100	3
		Total		27	21	450	270	180	900	

*MC-902 is a mandatory credit-less course in which the students will be required to get passing grade.

Note: All the students have to undergo 4 to 6 weeks Industrial Training after 4th semester which will be evaluated in 5th semester

Syllabus

B.Tech ECE IIIrd Semester

Credit Based

(2019-20)

BS - 201	Optics and Waves						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**3**	**75**	**25**	**100**	**3h**
Purpose	To introduce the fundamentals of wave and optics for the applications in Engineering field.						
	Course Outcomes						
CO 1	Familiarize with basic phenomenon used in propagation of waves.						
CO 2	Introduce the fundamentals of interference, diffraction, polarization and their applications.						
CO 3	To make the students aware to the importance of Laser in technology.						

Unit - I

Waves: Travelling waves, Characteristics of waves, Mathematical representation of travelling waves, General wave equation, Phase velocity, Light source emit wave packets, Wave packet and Bandwidth, Group velocity and real light waves.

Propagation of light waves: Maxwell's equations, Electromagnetic waves and constitutive relations, Wave equation for free-space, Uniform plane waves, Wave polarization, Energy density, the pointing vector and intensity, Radiation pressure and momentum, Light waves at boundaries, Wave incident normally on boundary, Wave incident obliquely on boundary: law of reflection, Snell's law and reflection coefficients.

Unit - II

Interference: Principle of Superposition, Conditions for Sustained interference, Young's double slit experiment, Division of wave-front: Fresnel's Biprism and its applications, Division of amplitude: Interference due to reflected and transmitted light, Wedge-shaped thin film, Newton's rings and its applications, Michelson Interferometer and its applications.

Unit – III

Diffraction: Types of diffraction, Fraunhofer diffraction at a single slit, Plane transmission diffraction grating: theory, secondary maxima and secondary minima, width of principal maxima, absent spectra, overlapping of spectral lines, determination of wavelength; Dispersive power and resolving power of diffraction grating.

Polarization: Polarization of transverse waves, Plane of polarization, Polarization by reflection, Double refraction, Nicol Prism, Quarter and half wave plate, Specific Rotation, Laurent 's half shade polarimeter, Biquartz polarimeter.

Unit – IV

Laser: Stimulated Absorption, Spontaneous and Stimulated Emission; Einstein's Coefficients and its derivation, Population Inversion, Direct and Indirect pumping, Pumping

schemes, Main components of Laser, Gas lasers (He-Ne, CO_2), Solid state lasers (Ruby, Neodymium, semiconductor), Dye laser, Characteristics of Laser, Applications of Laser.

Text/Reference Books:

1. P.K. Diwan, Applied Physics for Engineers, *Wiley India Pvt. Ltd*., *India*
2. N. Subrahmanyam, B. Lal, M.N. Avadhanulu, A Textbook of Optics, *S. Chand & Company Ltd., India.*
3. A. Ghatak, Optics, *McGraw Hill Education (India) Pvt. Ltd., India*.
4. E. Hecht, A.R. Ganesan, Optics, *Pearson India Education Services Pvt. Lt., India.*

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

EC-201	Electronic Devices						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
	Course Outcomes (CO)						
CO1	To understand the concept of carrier transport phenomena in semiconductors and diodes such as p-n junction diode and tunnel diode.						
CO2	To understand the detailed operation of BJT and calculation of its parameters using transistor models.						
CO3	To understand the operation, characteristics & parameters of FET and MOSFET.						
CO4	To understand the concept of different types of regulated power supplies and Op-Amp based voltage regulators						

UNIT-I

Charge Carriers Transport : Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Continuity equation, PN Junction: Basic Structure, small signal equivalent circuit of p-n diode, derivation of barrier potential and diode current equation, Simple diode circuits: clipping, clamping and rectifiers, Zener diode and its application as voltage regulator.

UNIT-II

Bipolar Junction Transistor: Basic principle of operation, Current gains : derivation of α, β, Υ and their relationship. Various modes of operation of BJT, Base Width Modulation, Transistor hybrid model, h-parameter equivalent circuit of transistor, Analysis of transistor amplifier using h-parameters, calculation of input impedance, output impedance and voltage gain.

UNIT-III

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (g_m), ac drain resistance (r_d), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

UNIT-IV

Regulated Power Supplies: Voltage Regulation, block diagram of DC regulated power supply, Zener diode voltage regulators: transistor series voltage regulator, Transistor shunt voltage regulator, Controlled Transistor Voltage Regulator, Op-Amp Series and shunt voltage regulator.

Text Books:

1. Millman & Halkias: Integrated Electronics, TMH.
2. Boylestad & Nashelsky: Electronic Devices & Circuit Theory, PHI.
Reference Books:
1. B.G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi, 1995.
2. E S. Yang, Microelectronic Devices, McGraw Hill, Singapore, 1988.
3. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.
4. S Salivahanan and N Naresh Kumar, Electronics devices and circuits, McGraw Hill,1998.

Note: Separate paper template will be provided to the paper setter for setting the question paper of end term semester examinations.

EC-203L				Electronic Devices Lab			
Lecture	Tutorial	Practical	Credit	Practical	Minor Test	Total	Time
-	-	2	1	60	40	100	3 Hrs.
Course Outcomes (CO)							
CO1	To teach the students how to experimentally plot the VI characteristics of various diodes such as p-n diode, zener diode etc. find the threshold voltage and zener breakdown voltage from the VI curve.						
CO2	To teach the students how to experimentally find the values of various parameters of Transistor such as voltage gain, current gain etc.						
CO3	To teach the students how to plot the input and output characteristics of FET and MOSFET by experimental method.						
CO4	To experimentally teach the students the concept of different configurations of regulated power supplies using Zener diodes and Op-Amp.						

List of experiments:

1. To study the VI characteristics of p-n diode in forward and reverse bias and find the threshold voltage from the VI curve.
2. To study the operation of Zener diode as a voltage regulator.
3. To study the operation of half-wave and full wave rectifiers and calculate their ripple factor values.
4. To study the operation of series and parallel Clippers using P-N junction diodes.
5. To study the operation of clampers using P-N junction diodes.
6. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
7. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
8. To study the transfer and drain characteristics of JFET and calculate its various parameters.
9. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.
10. To study the different types of negative feedback in two stage amplifier and to observe its effects upon the amplifier parameters.
11. To study the Zener diode as a transistor series voltage regulator.
12. To study the Zener diode as a transistor shunt voltage regulator.
Reference Books:

1. Millman & Halkias: Integrated Electronics, TMH.
2. Boylestad & Nashelsky: Electronic Devices & Circuit Theory, PHI.
Note: Atleast ten (10) experiments from the above list are mandatory to perform for the students.

EC-205	Digital Electronics						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
Course Outcomes (CO)							
CO1	Students will be able to understand the basic logic gates and will be able to apply minimization techniques for reducing a function upto six variables.						
CO2	Students will be able to design combinational circuits and applications related to them.						
CO3	Students will be able to write the truth table, excitation table, characteristic equations of various flip flops and to design the sequential circuits using Flip flops.						
CO4	Students will be able to familiarize with varied memory types and various A/D, D/A Converters and their characteristics.						

UNIT-I

Fundamentals of Digital Systems and Techniques: Digital signals, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, number systems: binary, signed binary, octal, hexadecimal number, binary arithmetic,one's and two's complements arithmetic, Codes:BCD codes, Excess-3, Gray codes, Error detecting and correcting codes: parity check codes and Hamming code

Minimization Techniques: Basic postulates and fundamental theorems of Boolean algebra: Standard representation of logic functions: SOP and POS forms, Simplification of switching functions using K-map and Quine-McCluskey tabular methods,Don't care conditions, Digital logic families: TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-statelogic.

UNIT-II

Combinational DigitalCircuits:Design procedure: Half adder, Full Adder, Half subtractor, Full subtractor , Parallel binary adder, parallel binary Subtractor, Carry Look Ahead adder, Serial Adder/Subtractor, BCD adder, Binary Multiplier, Binary Divider, Multiplexer/ De-multiplexer, decoder, encoder, parity checker, parity generators, code converters, Magnitude Comparator.

UNIT-III

Sequential circuits: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K, T and D types flip flops, applications of flip flops: shift registers, serial to parallel converter, parallel to serial converter, Synchronous and Asynchronous mod counter,FSM, sequence generator and detector.

UNIT-IV

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/Aconverter, specifications for D/A converters, analog to digital converters: quantization and encoding, parallel comparator A/Dconverter, successive approximation A/D converter, specifications for A/D converters

Semiconductor Memories and Programmable Logic Devices: Characteristics of memories, read only memory (ROM), read and write memory (RAM), Programmable logic array, Programmable array logic, Introduction to Field Programmable Gate Array (FPGA)

Text Books:
1. M. M. Mano, "Digital design", Pearson Education India, 2016.
2. Donald P. Leach and Albert Paul Malvino, Digital Principles and Applications, 8th Edition, TMH, 2003.
3. Taub Schilling, Digital Integrated Electronics, TMH
Reference Books:
1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. A.K. Maini, Digital Electronics, Wiley India
3. R P Jain, Modern digital electronics, TMH

Note: Separate paper template will be provided to the paper setter for setting the question paper of end term semester examinations.

EC-207L	Digital Electronics Lab						
Lecture	Tutorial	Practical	Credit	Practical	Minor Test	Total	Time
-	-	2	1	60	40	100	3 Hrs.
Course Outcomes (CO)							
CO1	Students will be able to verify truth tables of basic logic gates and design various gates using universal gates.						
CO2	Students will be able to design various combinational circuits and verify their operation.						
CO3	Students will be able to design different sequential circuits by using flip flops and verify their operation.						
CO4	Students will be to study and design various encoders and decoders.						

List of experiments:

1. Familiarization with Digital Trainer Kit and associated equipment.

2. Study of TTL gates AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.

3. Design and realize a given function using K-Maps and verify its performance.

4. To verify the operation of Multiplexer and De-multiplexer.

5. To verify the operation of Comparator.

6. To verify the truth table of S-R, J-K, T, D Flip-flops.

7. To verify the operation of Bi-directional shift register.

8. To design and verify the operation of 3-bit asynchronous counter.

9. To design and verify the operation of asynchronous Up/down counter.

10. To design and verify the operation of asynchronous Decade counter.

11. Study of Encoder and Decoder.

12. Study of BCD to 7 segment Decoder

Text Books:

1. M. M. Mano, "Digital design", Pearson Education India, 2016.
2. Donald P. Leach and Albert Paul Malvino, Digital Principles and Applications, 8th Edition, TMH, 2003.

Note: Atleast ten (10) experiments from the above list are mandatory to perform for the students.

ECE-209				Signals and Systems			
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	-	-	3	75	25	100	3 Hrs.
Course Outcomes (CO) **At the end of this course, students will demonstrate the ability to**							
CO1	Analyze different types of signals.						
CO2	Represent continuous and discrete systems in time and frequency domain using different transforms.						
CO3	Understand sampling theorem and its implications.						

UNIT-I

Introduction to Signals: Continuous and discrete time signals, deterministic and stochastic signals, periodic and a periodic signals, even and odd signals, energy and power signals, exponential and sinusoidal signals and singular functions. Signal representation in terms of singular functions, orthogonal functions and their use in signal representation

Introduction to Systems: Linear and non-linear systems, time invariant and time varying systems, lumped and distributed systems, deterministic and stochastic systems, casual and non-causal systems, analog and discrete/digital memory and memory less systems.

UNIT-II

Random Variables: Introduction to Random Variables, pdf, cdf, moments, distributions, correlation functions.

Linear Time Invariant Systems: Introduction to linear time invariant (LTI) systems, properties of LTI systems, convolution integral, convolution sum, causal LTI systems described by differential and difference equations, Concept of impulse response.

UNIT-III

Discretization of Analog Signals: Introduction to sampling, sampling theorem and its proof, effect of undersampling, reconstruction of a signal from sampled signal.

Fourier Series : Continuous time Fourier series (CTFS), Properties of CTFS, Convergence of Fourier series, Discrete time Fourier Series (DTFS), Properties of DTFS **,** Fourier series and LTI system, Filtering.

UNIT-IV

Fourier Transform: Continuous Time Fourier Transform (CTFT), Properties of CTFT, Systems characterized by linear constant- coefficient differential equations, Discrete time fourier transform (DTFT), Properties of DTFT, Duality, Systems characterized by Linear constant coefficient difference equations.

Laplace Transform: Introduction to Laplace transform, Region of convergence for laplace transform, Inverse laplace transform, Properties oflaplace transform, Analysis and characterization of LTI systems using laplace transform, System function algebra and block diagram representations,Unilateral laplace transform.

Text Books:

1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, Signals and Systems, Prentice Hall India, 2nd Edition, 2009

Reference Books:

1. Simon Haykins – "Signal & Systems", Wiley Eastern

2. Tarun Kumar Rawat , Signals and Systems , Oxford University Press.

3. H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2010.

4. M. J. Robert "Fundamentals of Signals and Systems", McGraw Hill Education, 2007.

5. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2009.

Note: Question paper template will be provided to the paper setter.

ECE-211L	Signals & Systems Lab						
Lecture	Tutorial	Practical	Credit	Practical	Minor Test	Total	Time
-	-	2	1	60	40	100	3 Hrs.
Course Outcomes (CO)							
CO1	To understand the basic concepts of software.						
CO2	To explore properties of various types of signals and systems.						
CO3	To explore different properties of signals and systems.						
CO4	To understand the concept of sampling in time and frequency domain.						

List of experiments:

1. Introduction of the MATLAB/SciLab/Octave software.
2. To demonstrate some simple signal.
3. To explore the effect of transformation of signal parameters (amplitude-scaling, time-scaling and time- shifting).
4. To visualize the complex exponential signal and real sinusoids.
5. To identify a given system as linear or non-linear.
6. To explore the time variance and time invariance property of a given system.
7. To explore causality and non-causality property of a system.
8. To determine Fourier transform of a signal.
9. To determine Laplace transform of a signal.
10. To demonstrate the time domain sampling of bandlimited signals (Nyquist theorem).
11. To demonstrate the sampling in frequency domain (Discrete Fourier Transform).
12. To demonstrate the convolution and correlation of two continuous-time signals.
13. To demonstrate the convolution and correlation of two discrete-time signals.

Reference Books:

1. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2009.

2. Signals and Systems using Scilab, www.scilab.in.

3.Signals and Systems using Octave, www.octave.org

Note: Atleast ten (10) experiments from the above list are mandatory to perform for the students.

EC-213	Network Theory						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
Course Outcomes (CO)							
CO1	To understand the concept of network topologies and the network analysis in the time domain for solving simple and complex circuits.						
CO2	Describe the circuit element models, network analysis using Laplace transform and time domain behavior from the pole-zero plots.						
CO3	Describe the characteristics & parameters of two port networks.						
CO4	To understand the concept of filters and synthesis of one port networks.						

UNIT I

INTRODUCTION: - Principles of network topology, graph matrices, Network Analysis (Time-Domain): Singularity Functions, Source-Free RC, RL, Series RLC, Parallel RLC circuits, Initial & Final Conditions, Impulse & Step Response of RC, RL, Series RLC, Parallel RLC circuits.

UNIT 2

NETWORK ANALYSIS (using Laplace Transform): - Circuit Element Models, Transient Response of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using Laplace transform.

NETWORK FUNCTIONS: - Terminal pairs or Ports, Network functions for one-port and two-port networks, poles and zeros of Network functions, Restrictions on pole and zero Locations for driving point functions and transfer functions.

UNIT 3

CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS: - Relationship of two-port variables, short-circuit admittance parameters, open circuit impedance parameters, transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.

UNIT 4

TYPES OF FILTERS AND THEIR CHARACTERISTICS: - Filter fundamentals, constant-k and m-derived low-pass and high-pass filters.

NETWORK SYNTHESIS: - Causality & Stability, Hurwitz Polynomials, Positive real functions, Synthesis of one port networks with two kind of elements.

TEXT BOOKS:
1. Fundamentals of Electric Circuits: Charles K. Alexander, Matthew N. O. Sadiku, McGraw Hill Education
2. Network Analysis: M.E. Van Valkenburg, PHI

REFERENCE BOOKS:
1. Network Analysis & Synthesis: F. F. Kuo, John Wiley.
2. Circuits & Networks: Sukhija & Nagsarkar, Oxford Higher Education.
3. Basic Circuit Theory: DasoerKuh, McGraw Hill Education.
4. Circuit Analysis: G.K. Mithal, Khanna Publication.

Note: Separate paper template will be provided to the paper setter for setting the question paper of end term semester examinations.

ES-201	Essentials of Information Technology						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	-	-	**3**	**75**	**25**	**100**	**3 Hrs.**
Course Outcomes (CO)							
CO1	**Develop basic computational thinking. Learn how to reason with variables, state transitions, conditionals, and iteration**						
CO2	**Understand the notion of data types, and higher order data structures such as lists, tuples, and dictionaries.**						
CO3	**Develop a basic understanding of computer systems -architecture, OS, mobile and cloud computing.**						
CO4	**Learn basic SQL programming**						

UNIT-I

Python Programming: Familiarization with the basics of Python programming, process of writing a program, running it, and print statements; simple data-types: integer, float, string. The notion of a variable, and methods to manipulate it, Knowledge of data types and operators: accepting input from the console, assignment statement, expressions, operators and their precedence. Conditional statements: if, if-else, if-elsif-else; Notion of iterative computation and control flow: for, while, flowcharts, decision trees and pseudo code

UNIT-II

Idea of debugging: errors and exceptions; debugging: pdb, break points. Sequence datatype: Lists, tuples and dictionary, Introduce the notion of accessing elements in a collection using numbers and names. Sorting algorithm: bubble and insertion sort; count the number of operations while sorting. Strings: Strings in Python : compare, concat, substring. **Data visualization using Pyplot:** line chart, pie chart, and bar chart.

UNIT-III

Computer Systems and Organisation: description of a computer system and mobile system, CPU, memory, hard disk, I/O, battery, power. Types of software:Types of Software – System Software, Utility Software and Application Software, how an operating system runs a program, operating system as a resource manager. **Cloud Computing**: Concept of cloud computers, cloud storage (public/private),and brief introduction to parallel computing.

UNIT-IV

Relational databases: idea of a database and the need for it, relations, keys, primary key, foreign key; use SQL commands to create a table, foreign keys; insert/delete an entry, delete a table. SQL commands: select, project, and join; indexes. Basics of NoSQL databases: Mongo DB

Text Books:

1. Python Programming: A modular approach by Sheetal Taneja and Naveen Kumar Pearson
Reference Books:
1. Python Programming - Using Problem Solving Approach by Reema Thareja Oxford Publication.
2. Database Management System a Practical Approach by Rajiv Chopra by S. Chand

Note: Separate paper template will be provided to the paper setter for setting the question paper of end term semester examinations.

MC-901	ENVIRONMENTAL SCIENCES						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	-	-	-	**75**	**25**	**100**	**3 Hrs.**
Purpose	To learn the multidisciplinary nature, scope and importance of Environmental sciences.						
Course Outcomes							
CO1	The students will be able to learn the importance of natural resources.						
CO2	To learn the theoretical and practical aspects of eco system.						
CO3	Will be able to learn the basic concepts of conservation of biodiversity.						
CO4	The students will be able to understand the basic concept of sustainable development.						

NIT 1

The multidisciplinary nature of environmental studies. Definition, Scope and Importance. Need for public awareness. Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

(a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber eztraction, mining, dams and their effects on forests and tribal people.
(b) Water Resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
(c) Mineral Resources- Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(d) Food Resources- World Food Problems, changes caused by agriculture and overgazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
(e) Energy Resources- Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
(f) Land Resources- Land as a resource, land, degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyle.

UNIT II

Ecosystem-Concept of an ecosystem. Sturcture and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological Succession. Food Chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem-

a. Forest Ecosystem
b. Grassland Ecosystem
c. Desert Ecosystem

       d. Aquatic Ecosystems(ponds, streams, lakes, rivers, oceans, esturaries

Field Work. Visit to a local area to document Environment assets-river/forest/grassland/hill/mountain. Visit to a local polluted site- Urban /Rural Industrial/Agricultural. Study of common plants, insects and birds. Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III

Biodiversity and its conservation. Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversityof global, National and local levels. India as a mega-diversity nation Hot spots of Biodiversity. Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts. Endangered and endemic species of India.Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

Environmental Pollution Definition. Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards
Solid waste management- cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides

UNIT IV

Social Issues and the Environment. From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns. Case Studies. Environmental ethics-issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland Reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public Awareness. Human population and the Environment. Population growth, variation among nations. Population explosion-Family Welfare Programme. Environment and human health. Human rights. Value Education. HIV/AIDS, Women and Child Welfare. Role of Information Technology in Environment and Human Health. Case Studies. Drugs and their effects; Useful and harmful drugs; Use and abuse of drugs; Stimulant and depressan   drugs. Concept of drug de-addiction. Legal position on drugs and laws related to drugs.

Text Books
1. Environmental Studies- Deswal and Deswal. Dhanpat Rai & Co.
2. Environmental Science & Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India
3. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
4. Environmental Science- Botkin and Keller. 2012. Wiley , India

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus

Syllabus

B.Tech ECE IVth Semester

(Credit Based)

(2019-20)

BS-204	HIGHER ENGINEERING MATHEMATICS						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 h
Purpose	The objective of this course is to familiarize the prospective Engineers with Laplace Transform, partial differential equations which allow deterministic mathematical formulations of phenomena in engineering processes and to study numerical methods for the approximation of their solution. More precisely, the objectives are as under:						
Course Outcomes							
CO 1	Introduction about the concept of Laplace transform and how it is useful in solving the definite integrals and initial value problems.						
CO 2	To introduce the Partial Differential Equations, its formation and solutions for multivariable differential equations originated from real world problems.						
CO 3	To introduce the tools of numerical methods in a comprehensive manner those are used in approximating the solutions of various engineering problems.						
CO 4	To familiar with essential tool of Numerical differentiation and Integration needed in approximate solutions for the ordinary differential equations.						

UNIT-1

Laplace Transform

Laplace Transform, Laplace Transform of Elementary Functions, Basic properties of Laplace Transform, Laplace transform of periodic functions, finding inverse Laplace transform by different methods, Convolution theorem, solving ODEs by Laplace Transform method.

UNIT-2

Partial Differential Equations

Formation of Partial Differential Equations, Solutions of first order linear and non-linear PDEs, Charpit's method, Solution to homogenous linear partial differential equations (with constant coefficients) by complimentary function and particular integral method.

UNIT-3

Numerical Methods-1

Solution of polynomial and transcendental equations: Bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT-4

Numerical Methods-2

Numerical Differentiation using Newton's forward and backward difference formulae, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules, Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations.

Textbooks/References:

1. S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993. AICTE Model Curriculum in Mathematics.
2. R. Haberman, Elementary Applied Partial Differential equations with Fourier Series and Boundary Value Problem, 4th Ed., Prentice Hall, 1998.

3.   Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.

4.   Manish Goyal and N.P. Bali, Transforms and Partial Differential Equations, University Science Press, Second Edition, 2010.

5.   N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

6.   B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

7.   Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.

8.   P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.

9.   S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

10. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

11. Erwin Kreyszig and Sanjeev Ahuja, Applied Mathematics-II, Wiley India Publication, Reprint, 2015.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

HM- 903	Soft Skills & Interpersonal Communication						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
Course Outcomes (CO)							
CO1	Develop basic understanding of Communication						
CO2	Understand the process of communication and speaking						
CO3	Develop the Personality concepts and its implementation						
CO4	Develop the basic of Group Discussion and interviews						

UNIT-I

Communication: Introduction Verbal, Non-Verbal, kinesics, proxemics, chronemics, Types of communication, extrapersonal communication, intrapersonal communication, intrapersonal communication, mass communication,Creativity in communication, Role of communication, flow of Communication and its need, Persuasive communication and negotiation;Time management in Persuasive communication, Importance of Persuasive Communication

UNIT-II

Barriers in the way of communication, noise, intrapersonal barriers, interpersonal barriers,organizational barriers, Extrapersonal barriers, Basics of communication:importance of communication,process of communication, objectives and characteristics of communication,Communication skills: Accent, Intonation, Phonetics, Speaking skills, Confidence, clarity, Fluency,Quality,pronunciation

UNIT-III

Personality Development; what is personality? Role of personality,Heredity, Environment, situation, Basics of personality, Soft skills; Needs and training, Activity in soft skills, Organizational skill;introduction and its need ,basics principles for Organization skills,Stress management;Introduction, Stress at home and office, Stress prevention, analyze the model of stress.

UNIT-IV

Group discussion, form of Group discussion, strategy for Group discussion, discussing problems and solution, Oral presentation, introduction, planning, Occasion, Purpose, Modes of delivery, Resume making;Purpose of Resume, Resume design and structure, contents in Resume, types of resume, Job interview, introduction, objective of Interview, types of interview, stages of interview,Face to face interview and campus interview

Text Books:
1.Technical Communication Principles and Practice by Meenakshi Raman and Sangeeta Sharma by Oxford Publication
Reference Books:
1.Personality Development and soft skills by Barun K. Mitra, Oxford Publication
2.Communication Skills For Engineers by C.Muralikrishna and Sunita Mishra, Pearson Pub.

Note: Separate paper **template** will be provided to the paper setter for setting the question paper of end term semester examinations.

EC-202				Digital Communication			
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
				Course Outcomes (CO)			
CO1	To learn digitization of analog signal by pulse modulation system and analyze their system performance						
CO2	To analyze different baseband transmission schemes and their performance.						
CO3	To learn and understand different digital modulation schemes and compute the bit error performance						
CO4	To analyze different modulation tradeoffs and different equalization techniques.						

UNIT-I

Pulse modulation.Sampling process. Pulse Amplitude and Pulse code modulation (PCM),Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing.Quantization noise in delta modulation, The O/P signal to quantization noise ratio in delta modulation, O/P signal to noise ratio in delta modulation, varients of DM.

UNIT-II

Base Band Pulse Transmission: Matched filter and its properties, average probability of symbol error in binary enclosed PCM receiver, Intersymbol interference, Nyquist criterion for distortionless base band binary transmission, ideal Nyquist channel raised cosine spectrum, correlative level coding Duo binary signalling, tapped delay line equalization, adaptive equalization, LMS algorithm, Eye pattern.

UNIT-III

Elements of Detection Theory, Optimum detection of signals in noise,Coherent communication with waveforms- Probability of Error evaluations.

Pass band Digital Modulation schemes- ASK, Phase Shift Keying, Frequency Shift Keying,Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying. Signal space diagram and spectra of the above systems, effect of intersymbol interference, bit symbol error probabilities, synchronization.

UNIT-IV

Digital Modulation tradeoffs.Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver).Equalization Techniques.Synchronization and Carrier Recovery for Digital modulation.

Text Books:

    1.Haykin S., "Communications Systems", John Wiley and Sons, 2001.

    2.Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.

    3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.

Reference Books:

    1.Proakis J.G., ``Digital Communications'', 4th Edition, McGraw Hill, 2000.

    2.Lathi B.P., " Modern Digital and Analog Communication", 4th edition, Oxford university Press, 2010

EC-204L	COMMUNICATION LAB						
Lecture	Tutorial	Practical	Credit	Practical	Minor Test	Total	Time
-	-	2	1	60	40	100	2 Hrs.
Course Outcomes (CO)							
Upon completion of the course, students will be able to							
CO1	Generate and analyze Analog Modulated and demodulated Signals.						
CO2	Test & observe the outputs of different types of analog detectors.						
CO3	Generate and analyze digital Modulated and demodulated Signals.						
CO4	Test & observe the outputs of different types of digital detectors.						

List of experiments:
1: To study and Perform Amplitude Modulation & Demodulation.
2: To study and Perform Frequency Modulation and Demodulation.
3: To study and Perform Pulse Amplitude Modulation and Demodulation.
4: To study and Perform Pulse Width Modulation and Demodulation.
5: To study and Perform Pulse Position Modulation and Demodulation.
6: To study and Perform Pulse Code Modulation and Demodulation.
7: To study and Perform Time Division Multiplexing (TDM) system.
8: To study and Perform Amplitude Shift Keying (ASK) Modulation and De- Modulation.
9: To study and Perform Frequency Shift Keying (FSK) Modulation and De-Modulation.
10: To study and Perform Phase Shift Keying (PSK) Modulation and De-Modulation.
11: To study and Perform Quadrature Phase Shift Keying (QPSK) Modulation and De-Modulation.
12: To study and perform Adaptive Delta Modulation and demodulation.
13. To study Base Band Transmission and calculate bit error rate.

Note: At least ten (10) experiments from the above list are mandatory to perform for the students.

Reference Books:
1. Taub & Schilling, Principles of Communication Systems, McGraw Hill Publications, (1998) 2nd ed.
2. Simon Haykin, Communication Systems, John Wiley Publication, 3rd ed.
3. Sklar, Digital Communications, Prentice Hall-PTR, (2001) 2nd ed.
4. Lathi B. P., Modern Analog and Digital Communication, , Oxford University Press, (1998) 3rd

EC-206	Analog Circuits						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
Course Outcomes (CO)							
CO1	To make the students understand the analysis of various BJT and FET amplifiers using small signal models.						
CO2	To teach the students the concept of describe the frequency response of multistage amplifiers and the detailed concept of feedback topologies.						
CO3	To make the students learn various oscillator circuits using both Op-Amp and BJT.						
CO4	To teach the students the various application circuits of Op-Amp and designing for a given specification.						

UNIT-I

Amplifier Models: Amplifier types: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier, comparison based on input impedance and output impedance. Small signal analysis of BJT amplifiers: CE, CB and CC amplifiers using r_e model, small signal analysis of the CS JFET amplifiers, estimation of voltage gain, input resistance, output resistance etc, design procedure for particular specifications of amplifiers.
UNIT-II

Transistor Frequency Response: Class A, class B, class C amplifiers: calculation of maximum efficiency. Frequency response of the amplifiers: low frequency, mid-frequency and high frequency region. Effect of cascading of amplifiers on the frequency response, cut-off frequencies, Bandwidth and voltage gain. Miller effect, Feedback in amplifiers: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth, input impedance, output impedance.

UNIT-III

Oscillators: Barkhausen criterion for oscillators, types of Oscillators: RC phase shift oscillator, Wien bridge oscillator, LC oscillators : Hartley oscillator, Collpit oscillator, derivation of frequency of oscillation for BJT and Op-amp configurations, 555 timer: operation as astable and monostable multivibrator.

UNIT-IV

Op-Amp Applications: Simple op-amp circuits: adder, subtractor, Schmitt trigger, Differential amplifier: calculation of differential gain, common mode gain, CMRR, OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages.

Text Books:

1. Millman & Halkias: Integrated Electronics, TMH.
2. Boylestad & Nashelsky: Electronic Devices & Circuit Theory, PHI.

Reference Books:
1. B.G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi, 1995.
2. E S. Yang, Microelectronic Devices, McGraw Hill, Singapore, 1988.
3. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.
4. S Salivahanan and N Naresh Kumar, Electronics devices and circuits, McGraw Hill,1998.

Note: Separate paper template will be provided to the paper setter for setting the question paper of end term semester examinations.

EC-208L	Analog Circuits Lab						
Lecture	Tutorial	Practical	Credit	Practical	Minor Test	Total	Time
-	-	2	1	60	40	100	3 Hrs.
Course Outcomes (CO)							
CO1	To design and calculate the gain , frequency response etc. of the various configuration of transistor amplifier.						
CO2	To make students Design various RC oscillators using Op-Amp 741 for a given frequency of oscillation.						
CO3	To make students Design various RC oscillators using BJT for a given frequency of oscillation.						
CO4	To teach the students the design of various Op-Amp circuits such as adder, subtractor etc.						

List of experiments:

1. To design a simple common emitter (CE) amplifier circuit using BJT and find its gain and frequency response. To design a differential amplifier using BJT and calculate its gain and frequency response.
2. To design a BJT emitter follower and determine is gain, input and output impedances.
3. To design and test the performance of Phase shift Oscillator using Op-Amp 741.
4. To design and test the performance of Wien bridge oscillator using Op-Amp 741.
5. To design and test the performance of BJT - RC Phase shift Oscillator for $f0 \leq 10$ KHz.
6. To design and test the performance of BJT – Hartley Oscillators for RF range $f0 \geq 100KHz$.
7. To design and test the performance of BJT – Colpitt Oscillators for RF range $f0 \geq 100KHz$.
8. To design an astable multivibrator using 555 timer.
9. To design a monostable multivibrator using 555 timer.
10. To design Schmitt trigger using Op-amp and verify its operational characteristics.
11. To design an adder circuit using Op-Amp to add three dc voltages.
12. To design a subtractor using Op-Amp to subtract DC voltages v1 and v2.

Reference Books:

1. Millman & Halkias: Integrated Electronics, TMH.
2. Boylestad & Nashelsky: Electronic Devices & Circuit Theory, PHI.
3. S Salivahanan and N Naresh Kumar, Electronics devices and circuits, McGraw Hill,1998.
Note: Atleast ten (10) experiments from the above list are mandatory to perform for the students.

EC-210	MICROPROCESSORS AND MICROCONTROLLER						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
Course Outcomes (CO)							
CO1	Acquired knowledge about the architecture of Microprocessors and Microcontrollers.						
CO2	Acquired knowledge about instruction set and programming concept of Microprocessors and Microcontrollers in assembly and C language.						
CO3	To understand peripheral interfacing with Microprocessors and Microcontrollers.						
CO4	To design the systems /models based on Microprocessors and Microcontrollers						

UNIT-I

Evolution of Microprocessor, Introduction to 8-bit Microprocessor 8085 architecture, Pin Details 8085 Microprocessor, 8086 Architecture description of data registers, address registers; pointer and index registers, PSW, Queue, BIU and EU, 8086 Pin diagram descriptions. Generating 8086 CLK and reset signals using 8284. WAIT state generation. Microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode.

UNIT-II

8051 Architecture, On-chip memory organization – general purpose registers, SFR registers, Internal RAM and ROM, Oscillator and Clock circuits. Pin Diagram of 8051, I/O Pins, Port, Connecting external memory, Counters and Timers, Purpose of TCON & TMOD registers, Serial data transmission/reception and transmission modes, Purpose of SCON & PCON registers, Different Types of Interrupts, Purpose of Time Delays, 8051 addressing modes.

UNIT-III

8086 Instruction format, addressing modes, Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions; process control instructions. 8051 Data transfer instructions, arithmetic and logical instructions, Jump and Call instructions, I/O port, Timer and Counter programming, Serial port and Interrupt programming, Assembly language programs.

UNIT-IV

Memory devices, Address decoding techniques, Interfacing SRAMS; ROMS/PROMS, 8086 Interrupt mechanism; interrupt types and interrupt vector table. Intel's 8255 - description and interfacing with 8086, ADCs and DACs, - types operation and interfacing with 8086.

Interfacing of Matrix Keyboards, ADC, DAC, Temperature Sensor, Stepper Motor with 8051.

Text Books:

1. D.V. Hall, Microprocessors and Interfacing, McGraw Hill 2nd ed.
2. Kenneth Ayala," The 8051 Microcontroller" 3rd ed. CENGAGE Learning.

3. M.A. Mazidi, J.G. Mazidi, R. D. McKinlay," The 8051 Microcontroller and Embedded systems using assembly and C" -2nd Ed, Pearson Education.
4. Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005.
5. Barry B. Brey, "The Intel Microprocessor8086/8088, 80186", Pearson Education, Eighth Edition, 2009.
6. Uffenback, "The 8086 Family Design" PHI, 2nd Edition.

Reference Books:

1. Mke Predko, "Programming and Customizing the 8051 Microcontroller", TMH.
2. Manish K Patel,"Microcontroller based embedded system", McGraw Hill Education.

Note: Separate paper template will be provided to the paper setter for setting the question paper of end term semester examinations.

EC-212L	MICROPROCESSORS AND MICROCONTROLLER LAB						
Lecture	Tutorial	Practical	Credit	Practical	Minor Test	Total	Time
-	-	2	1	60	40	100	3 Hrs.
Course Outcomes (CO)							
CO1	To familiarization with 8085, 8086 Microprocessors and 8051 Microcontrollers.						
CO2	Ability to write an assembly language program for 8086 Microprocessors as well as C language program for 8051 Microcontroller.						
CO3	Ability to interfacing the various Peripheral to 8086 Microprocessors and 8051 Microcontrollers.						
CO4	Ability to design the systems based on 8051 Microcontrollers.						

List of experiments to be performed using 8086 and 8051 Microcontrollers

For 8086 Microprocessor write an Assembly Language Program to

1 Add / Sub two 16 bit numbers.
2 Multiply two 16 bit unsigned/ signed numbers.
3 Divide two unsigned/ signed numbers (32/16 , 16/8, 16/16, 8/8)
4 Find smallest/ largest number from array of n numbers.
5 Arrange numbers in array in ascending/ descending order.
6 Convert Hex to Decimal, Decimal to Hex.
7 Compare two strings using string instructions / without using string instructions.
8 Display string in reverse order, string length, Concatenation of two strings.
9 To find 1's and 2's complement of a number.
10 To find the Fibonacci Series.
11 To find Log of a given number using look up table.
12 To find Factorial of a number.
13 To write an ALP using 8051 Microcontrollers to perform addition, subtraction, multiplication and division of two eight bit numbers.
14 To write an ALP using 8051 Microcontrollers to perform logical operation i.e., AND, OR, XOR and Complement of two eight bit numbers.
15 To write an ALP using 8051 Microcontrollers to perform multi byte addition and subtraction of unsigned number.
16 To write an embedded C program using 8051 Microcontrollers for interfacing LCD to display message "LCD Display" on LCD screen.
17 To write an embedded C program using 8051 Microcontrollers for interfacing keypad to port P0 .Whenever a key is pressed; it should be displayed on LCD.
18 To write an embedded C program using 8051 Microcontrollers for interfacing a switch and a buzzer to two different pins of a Port such that the buzzer should sound as long as the switch is pressed.
19 To write an embedded C program using 8051 Microcontrollers for interfacing stepper motor to rotate clockwise and anticlockwise directions.
20 To write an embedded C program using 8051 Microcontrollers for interfacing relay and buzzer.

Reference Books:

1. Kenneth Ayala," The 8051 Microcontroller" 3rd ed. CENGAGE Learning.
2. M.A. Mazidi, J.G. Mazidi, R. D. McKinlay," The 8051 Microcontroller and Embedded systems using assembly and C" -2nd Ed, Pearson Education.

Note: Atleast ten (10) experiments from the above list are mandatory to perform for the students.

ES -202				BASICS OF ANALOG COMMUNICATION			
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
Course Outcomes (CO)							
Upon completion of the course, students will be able to							
CO1	Describe different types of noise and predict its effect on various analog communication systems.						
CO2	Understand and analyze various Amplitude modulation and demodulation methods.						
CO3	Understand and analyze Angle modulation and demodulation methods.						
CO4	Understand the concepts of Transmitters and Receivers and their circuits.						

Unit-I

Communication system and Noise: Constituents of communication system, Modulation, Bandwidth requirement, Noise, Classification of noise, Resistor noise, Multiple resistor noise sources, Noise Temperature, Noise bandwidth, Noise figure, its calculation and measurement, Bandpass noise representation, Noise calculation in Communication Systems: Noise in Amplitude Modulated System, Noise in angle modulated systems.

Analog Modulation Techniques: Theory of amplitude modulation, AM power calculations, AM modulation with a complex wave, Concepts of angle modulation, Theory of frequency modulation, Mathematical analysis of FM, Spectra of FM signals, Narrow band FM, Wide band FM, Phase modulation, Phase modulation obtained from frequency modulation, Comparison of AM, FM & PM.

Unit-II

AM Transmission: Generation of Amplitude Modulation, Low level and high level modulation, Basic principle of AM generation, Square law modulation, Vander bijl modulation, Suppressed carrier AM generation (Balanced Modulator) ring Modulator.

AM Reception: Tuned Ratio Frequency (TRF) Receiver, Super heterodyne Receiver, RF Amplifier, Image Frequency Rejection, Cascade RF Amplifier, Frequency Conversion and Mixers, Tracking & and Alignment, IF Amplifier, AM detectors, Distortion in diode detectors, AM receiver characteristics.

Unit-III

FM Transmission: FM allocation standards, Generation of FM by direct method, Varactor diode Modulator, Indirect generation of FM, The Armstrong method RC phase shift method, Frequency stabilized reactance FM transmitter, FM stereo transmitter, Noise triangle.

FM Reception: Direct methods of Frequency demodulation, Frequency discrimination (Balanced slope detector), Foster seelay of phase discriminator, Ratio detector, Indirect method of FM demodulation, FM detector using PLL, Pre-emphasis / de-emphasis, FM receiver, FM stereo receiver.

Unit-IV

SSB Transmission: Introduction, Advantages of SSB Transmission, Generation of SSB, The Filter method The Phase Shift Method, The Third Method, Pilot Carrier SSB, Vestigial Side-band Modulation (VSB), VSB-SC, Application of AM and FM in TV transmission.

SSB Reception: SSB Product Demodulator, Balanced Modulator as SSB Demodulator, Pilot Carrier SSB Receiver, Modern Communication Receiver.

Analog Pulse Modulation: Introduction, Pulse amplitude modulation (PAM), PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation (PTM): Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), PWM and PPM Demodulator,

Text Books

1. Kennedy, G., Electronic Communication Systems, McGraw-Hill (2008) 4th ed.
2. Lathi.B.P.,Modern Digital and Analog Communications Systems 3rd ed.

Reference Books:

1.Taub, H., Principles of Communication Systems, McGraw-Hill (2008) 3rd ed.

2. Haykin, S., Communication Systems, John Willey (2009) 4th ed.

3. Proakis, J. G. and Salehi, M., Fundamentals of Communication Systems, Dorling Kindersley (2008) 2nd ed.

4. Mithal G K, Radio Engineering, Khanna Pub.

5. Singh & Sapre—Communication Systems: 2/e, TMH

Note: Separate paper template will be provided to the paper setter for setting the question paper of end term semester examinations.

MC-902	Constitution of India					
Lecture	Tutorial	Practical	Major Test	Minor Test	Total	Time
3	-	-	75	25	100	3 Hrs.
Purpose	To know the basic features of Constitution of India					
Course Outcomes						
CO1	The students will be able to know about salient features of the Constitution of India.					
CO2	To know about fundamental duties and federal structure of Constitution of India.					
CO3	To know about emergency provisions in Constitution of India.					
CO4	To know about fundamental rights under constitution of India.					

UNIT-I
1. Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India. Salient features and characteristics of the Constitution of India.
2. Scheme of the fundamental rights

UNIT - II

3. The scheme of the Fundamental Duties and its legal status. The Directive Principles of State Policy – Its importance and implementation. Federal structure and distribution of legislative and financial powers between the Union and the States.
4. Parliamentary Form of Government in India – The constitution powers and status of the President of India

UNIT - III

5. Amendment of the Constitutional Powers and Procedure. The historical perspectives of the constitutional amendments in India.
6. Emergency Provisions: National Emergency, President Rule, Financial Emergency. Local Self Government – Constitutional Scheme in India.

UNIT-IV

7. Scheme of the Fundamental Right to Equality. Scheme of the Fundamental Right to certain Freedom under Article 19.

8. Scope of the Right to Life and Personal Liberty under Article 21.

Text Books
 1. Constitution of India. Prof.Narender Kumar (2008) 8th edition. Allahabad Law Agency.
Reference Books:
 1. The constitution of India. P.M. Bakshi (2016) 15th edition. Universal law Publishing.